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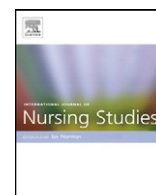
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## Low job satisfaction does not identify nurses at risk of future sickness absence: Results from a Norwegian cohort study

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### ABSTRACT

**Background:** Sickness absence is high in healthcare and contributes to nursing staff shortages reducing the efficiency and quality of patient care. Assessing the risk of sickness absence in working nurses opens opportunities for preventive strategies. Job satisfaction has attracted much attention in healthcare research and has been associated with sickness absence among nurses.

**Objectives:** To investigate if job satisfaction scores are useful to identify working nurses at risk of future sickness absence.

**Design:** Prospective cohort study with a baseline period from November 2008 to March 2009 and 1-year follow-up.

**Settings:** Hospitals, nursing homes, and ambulant care settings in Norway.

**Participants:** 2059 Norwegian nurses, of whom 1582 (77%) could be followed-up.

**Methods:** Nurses received a questionnaire at baseline and after 1-year follow-up. The questionnaire contained the Job Satisfaction Index (JSI), a 5-item scale measuring overall job satisfaction, and asked for sickness absence in the last 12 months. Baseline JSI scores were included in a logistic regression model with self-rated sickness absence at 1-year follow-up as outcome variable. Predictions of sickness absence were calibrated by the Hosmer–Lemeshow goodness-of-fit test. The ability of JSI scores to discriminate between nurses with and without sickness absence was examined by receiver operating characteristic analysis and expressed as area under the curve (AUC).

**Results:** Low job satisfaction was associated with higher odds of sickness absence (odds ratio [OR] = 1.05; 95% confidence interval [CI] 1.01–1.09) and high ( $\geq 31$  days) sickness absence (OR = 1.10; 95% CI 1.06–1.14). Calibration was acceptable, but job satisfaction neither discriminated between nurses with and without sickness absence (AUC = 0.54; 95% CI 0.51–0.58) nor between nurses with and without high ( $\geq 31$  days) sickness absence (AUC = 0.58; 95% CI 0.54–0.63).

**Conclusions:** The results of this study indicated that job satisfaction was associated with sickness absence, though job satisfaction scores as measured with the JSI did not identify working nurses at risk of sickness absence.

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### What is already known about the topic?

- Cross-sectional studies have reported inconsistent associations between job satisfaction and sickness absence among nurses.
- No studies have investigated if job satisfaction scores are useful to identify working nurses at risk of future sickness absence.

### What this paper adds

- Low job satisfaction was prospectively associated with higher self-reported sickness absence during a 1-year follow-up period, but the association was weak.
- Although calibration as predictor of future sickness absence was acceptable, job satisfaction failed to discriminate between nurses with and without sickness absence.
- Further research is needed to investigate whether other (multidimensional) job satisfaction instruments, if necessary combined with other predictors, identify working nurses at risk of sickness absence.

## 1. Introduction

Nursing shortages are a major problem in many countries, where the demand for nursing care is increasing and nursing responsibilities are widening. The shortage of registered nurses will worsen, because demands for nursing services are on the increase due to longer life expectancies and higher numbers of people living with chronic disease. In the United States, the demand for nursing services will exceed the supply by nearly 30% in 2020 (Andrews and Dziegielewska, 2005). The ageing workforce, declining enrollment of new nurses, and high turnover intentions have been identified as the main causes for current nursing shortages (Janizewski Goodin, 2003; Coomber and Barriball, 2007; Duvall and Andrews, 2010).

The nursing staff is further reduced by high sickness absence levels in healthcare (National Survey of the Work and Health of Nurses, 2005; Occupational Safety and Health Administration, 2010; National Health Service, 2011), resulting in increased work pressure and lower morale of the remaining staff (Aiken et al., 2002; Lang et al., 2004). Consequently, the efficiency and quality of nursing care decrease, which adversely affects patient outcomes (Kane et al., 2007; Aiken et al., 2012). In a systematic review of the literature, Davey et al. (2009) found that an individual nurse's work attitudes were strongly associated with sickness absence. Work attitudes refer to personal feelings or beliefs associated with work, such as job and work involvement, organizational commitment, group commitment, occupational commitment, and job satisfaction.

### 1.1. Job satisfaction among nurses

Job satisfaction has attracted much attention in healthcare research. There is a large body of knowledge

about determinants of job satisfaction among nurses. From a systematic review of the literature, Lu et al. (2005) reported that work stress, organizational commitment, depression, and cohesion within a nursing team were most strongly correlated with job satisfaction of nurses, with Pearson correlation coefficients ( $r$ )  $>0.50$ . Moderate associations ( $0.20 < r < 0.50$ ) were found for autonomy, supervisor and co-worker support, and both collaboration and communication with medical staff. Personal factors such as age, professionalism, years of experience, and job involvement were weakly associated ( $r < 0.20$ ) with job satisfaction among nurses. A meta-analysis of 31 studies representing a total of 14,567 nurses in various healthcare settings showed that job satisfaction was most consistently correlated with work stress, followed by nurse–physician collaboration, and autonomy (Zangaro and Soeken, 2007). Although a single factor at a given point in time may lead a nurse to consider a job satisfying or not, job satisfaction is generally multifactorial, i.e. determined by a combination of intra-personal, inter-personal, and work factors (Utriainen and Kingäs, 2009; Hayes et al., 2010; Lu et al., 2012).

### 1.2. Job satisfaction and sickness absence among nurses

Most studies in the eighties and early nineties failed to find a significant relationship between job satisfaction and sickness absence among nurses. Taunton et al. (1995) studied 1107 nurses working in four U.S. hospitals and reported that sickness absence decreased if job satisfaction increased. However, the authors used an untitled non-validated job satisfaction instrument. Matrunola (1996) developed a job satisfaction instrument adjusted to the setting of a British district hospital and found no significant association between job satisfaction and sickness absence among 50 nurses of an elderly care unit. It should be acknowledged that the author investigated a very small and non-representative sample of nurses with a non-validated job satisfaction instrument.

Gauci Borda and Norman (1997) studied job satisfaction in a sample of 254 Maltese hospital nurses with the Global Satisfaction Index, which is a validated instrument to measure overall job satisfaction. The authors reported that overall job satisfaction was negatively associated with the recorded frequency of short-term sickness absence, but not with the number of sickness absence episodes lasting longer than three days. However, they measured job satisfaction in February 1996 and sickness absence in the period February 1995 to February 1996. Thus, sickness absence preceded the measurement of job satisfaction and, therefore, we cannot infer that the higher frequency of short-term sickness absence was the result of low job satisfaction.

Song et al. (1997) annually measured job satisfaction with the Job Diagnostic Survey in 143 South Korean hospital nurses during 4 years. Overall job satisfaction did not differ between nurses working in a special care unit ( $N=34$ ) and nurses working in the intensive care unit ( $N=109$ ), though satisfaction with payment and supervision was higher in the special care unit. Sickness absence levels were lower in the special care unit (1.2%) than in the intensive care unit (2.8%). The authors concluded that

higher satisfaction and lower sickness absence rates coincided in the special care unit. This may be true for specific aspects of satisfaction, but not for overall job satisfaction which did not differ between units. Furthermore, the results are difficult to interpret, because job satisfaction and sickness absence were investigated at unit level, not at the individual level.

Siu (2002) studied overall job satisfaction at the individual level in two samples of Hong Kong hospital nurses. In one sample ( $N=144$ ), job satisfaction was significantly related to the number of self-reported sickness absence days during 1-year follow-up, while in the other sample ( $N=114$ ) no significant associations were found. These inconsistent findings may be explained by unmatched gender ratios and nursing settings as there were more men (33%) and more psychiatric nurses (49%) in the larger sample, in which job satisfaction was associated with sickness absence, as compared to 15% and 25%, respectively in the other sample.

### 1.3. Aim of the study

The results from previous studies are inconclusive, so we need more studies to investigate the relationship between job satisfaction and sickness absence in nurses. Better understanding of associations between job satisfaction and sickness absence is important to assist nurse managers in preventing sickness absence and improving nurse staffing. This study investigated the prospective associations of job satisfaction with sickness absence among Norwegian nurses.

We specifically wanted to know if job satisfaction scores forecast the risk of sickness absence and identify working nurses at risk of sickness absence. For that purpose, prospective associations between job satisfaction and sickness absence are not sufficient. An association neither tells us if job satisfaction scores accurately predict future sickness absence (calibration), nor if job satisfaction scores discriminate individuals with sickness absence from those without sickness absence (discrimination). This is the first study that addresses the calibration and discrimination characteristics of job satisfaction as predictor of future sickness absence in nurses. If calibration and discrimination are adequate, then job satisfaction scores can be used to identify working nurses at risk of sickness absence and invite them for preventive counseling.

## 2. Methods

### 2.1. Data source

We performed a secondary analysis of data retrieved from the Norwegian Survey of Shift work, Sleep and Health, which included 5400 nurses educated after 1995 and working in various healthcare settings. At baseline (November 2008–March 2009), they received a questionnaire by postal mail and could return the completed questionnaires in a pre-paid envelope to the Department of Public Health and Primary Health Care of the University of Bergen. A total of 2059 nurses (38%), who had returned the

baseline questionnaire, received a follow-up questionnaire in the period from January to May 2010.

The disadvantage of secondary analyses is that data are retrieved from studies that were designed for other purposes. The Survey of Shift work, Sleep and Health focused on shift work, sleep, and health of Norwegian nurses. Job satisfaction was included in the survey questionnaire, but not a key issue of the Survey of Shift work, Sleep and Health. Consequently, the survey questionnaire did not specifically address variables that are important with regard to nurses' job satisfaction, such as work stress, autonomy and nurse–physician interactions. Potential confounding by these variables could be partly controlled for by adjusting the analyses for work conditions. For the rest, confounding will not pose a great problem, because it is of minor importance in prediction research (Steyerberg, 2009). We were interested in the predictive performance of job satisfaction rather than its causal relationship with sickness absence.

### 2.2. Ethical considerations

The Regional Committee for Medical and Health Research Ethics, West Norway approved the Survey of Shift work, Sleep and Health.

### 2.3. Background data

The survey questionnaire included the demographic items age, gender, work setting (somatic hospital, psychiatric hospital, nursing home, home care services, other) and work hours (<20, 20–29, 30–36, >36 h/week). Work conditions were measured with items of the short version of the Job Content Questionnaire (Sanne et al., 2005). Psychological demands were measured with 5 questions about work pace and efforts (Cronbach's  $\alpha=0.79$  in this study) having a score range from 1 'yes, often' to 4 'no, almost never', and a sum score of 5–20; high scores indicated high psychological demands in work. Decision latitude was measured with 6 items ( $\alpha=0.72$  in this study) on skill discretion and decision authority with a sum score of 6–24 and high scores indicating high control over work. Social support was measured with 6 items ( $\alpha=0.82$  in this study); the sum score ranged 6–24 and high sum scores indicated high social support at work.

Physical and mental health were measured with the Short-Form 12 version 2 (SF-12v2<sup>®</sup>), which is a generally used self-report measure of health-related quality of life (Ware et al., 2002). A physical component score and a mental component score were calculated based on the algorithm from the User's Manual for the SF-12v2<sup>®</sup> Health Survey (Ware et al., 2002) and standardized to a score range 0–100 with higher scores reflecting better health.

### 2.4. Job satisfaction

Various theories have presented different conceptualizations of job satisfaction, though two main components run through these theories: an affective component (i.e. a feeling of satisfaction) and a cognitive component (i.e. an evaluation of whether one's job meets one's needs). Over

the years, the attitudinal perspective has become predominant in job satisfaction research (Spector, 1997). We defined job satisfaction as an individual's attitudes toward his/her job expressed as an overall feeling of content about the job (Brayfield and Rothe, 1951; Gruneberg, 1976; Brayfield et al., 2001). Job satisfaction was measured with the Job Satisfaction Index (JSI), an attitude scale reflecting overall job satisfaction (Brayfield and Rothe, 1951). The JSI consists of 5 items ( $\alpha = 0.84$  in this study), each scored on a 5-point Likert scale. Three positive wording items were scored as follows: 'strongly disagree' = 5, 'disagree' = 4, 'undecided' = 3, 'agree' = 2, and 'strongly agree' = 1. Two negative wording items were inversely scored, i.e. 'strongly disagree' = 1, 'disagree' = 2, 'undecided' = 3, 'agree' = 4, and 'strongly agree' = 5. As a result, higher JSI scores (range 5–25) reflected lower job satisfaction.

## 2.5. Sickness absence

In Norway, employers pay sickness benefits (100%) in the first 16 calendar days of sickness absence. At the time of this study, employees could self-certify for sickness absence up to 3 days or 8 days four times per year, depending on their employers' settlement with the Norwegian Labour and Welfare Organization. Otherwise, sickness absence had to be medically certified by a physician. After 16 calendar days, the Norwegian Labour and Welfare Organization pays sickness benefits (100%). If sickness absence lasts beyond six weeks, employee and employer have to agree on a plan detailing how the employee is going get back to work. Sickness benefits in Norway are paid for up to one year, after which employees receive other benefits, such as rehabilitation allowances or disability benefits.

In this study, we defined sickness absence as either self-certified or medically certified absence from work due to one's own illness, excluding absence related to children or other family members. The survey questionnaire asked nurses whether or not they had been absent due to their own sickness during the past 12 months (yes/no). Nurses who ticked 'yes' were asked to indicate the total number of sickness absence days in the past 12 months in the categories 1–7 days, 8–14 days, 15–30 days, 31–90 days and 91+ days. It should be acknowledged that these were the accumulated sickness absence days in a 12 months' period and not necessarily consecutive sickness absence days. We defined high sickness absence as  $\geq 31$  days in 12 months (Roelen et al., 2012), which has been the definition of high sickness absence in the Norwegian welfare system for some time. Sickness absence was measured at follow-up in the period January to May 2010. At that time, nurses recalled their sickness absence in the year following baseline.

## 2.6. Statistical analysis

All statistical analyses were performed in SPSS for Windows, version 18. We included baseline JSI scores as continuous independent variables in a logistic regression model with sickness absence (no/yes) during 1-year follow-up as outcome variable. Likewise, baseline JSI scores were linked to high sickness absence (no/yes) during 1-year follow-up. Linear associations between JSI

scores and (high) sickness absence were checked and confirmed. Logistic regression analysis estimated odds ratios (ORs) and 95% confidence intervals (CIs). ORs were adjusted stepwise for continuous (age, work conditions, physical and mental health) and categorical (gender, setting and work h/week) background variables. We regarded the logistic regression's Nagelkerke's  $R^2$  as a measure for the overall predictive performance of job satisfaction forecasting future (high) sickness absence (Steyerberg, 2009; Steyerberg et al., 2010).

The predictive performance of job satisfaction was further quantified in terms of calibration and discrimination. Calibration refers to the agreement between predicted and observed sickness absence risks, and was assessed by the Hosmer–Lemeshow goodness-of-fit test (Steyerberg et al., 2010). Hosmer–Lemeshow  $P$ -values  $\geq 0.05$  reflect acceptable calibration. Discrimination refers to the ability of job satisfaction to distinguish between nurses with and without (high) sickness absence. We assessed discrimination by receiver operating characteristic (ROC) analysis and regarded the area under the ROC-curve (AUC) as a measure for the discriminative ability (Steyerberg et al., 2010). An AUC of 0.5 indicates no discrimination above chance, an AUC of 1.0 indicates perfect discrimination, and an AUC  $\geq 0.75$  reflects adequate discrimination (Fad et al., 2006).

## 3. Results

At baseline, 2059 (38%) of 5400 nurses returned the survey questionnaire. After one year, follow-up questionnaires were sent to these 2059 nurses and 1582 (77%) of them returned the questionnaire. A total of 477 nurses (23%) were lost to follow-up, but their baseline characteristics did not differ from those of nurses who returned the follow-up questionnaire (Table 1).

JSI and sickness absence data were missing for 28 responders. We performed a complete case analysis for which 1554 responders with complete data were eligible. Their JSI score (Table 2) averaged 9.9 (SD = 3.6) at baseline. The JSI scores of permanently employed nurses ( $N = 1206$ ; mean = 9.9, SD = 3.5) did not differ significantly (Mann–Whitney,  $P = 0.33$ ) from those of nurses with temporary contracts ( $N = 348$ ; mean = 10.2, SD = 3.6). At follow-up, the average JSI score was 9.8 (SD = 3.5), which did not differ significantly from the baseline JSI score (Wilcoxon's paired signed rank,  $P = 0.11$ ).

At follow-up, 1271 nurses (82%) reported to have been absent due to their own sickness in the past 12 months, of whom 675 (53%) 1–7 days, 200 (16%) 8–14 days, 159 (13%) 15–30 days, 144 (11%) 31–90 days, and 93 (7%) 91+ days; a total of 237 nurses had high sickness absence.

Lower job satisfaction at baseline was associated with higher odds of both sickness absence (OR = 1.05; 95% CI 1.01–1.09) and high sickness absence (OR = 1.10; 95% CI 1.06–1.14) during 1-year follow-up. The strength of the associations did not change substantially after controlling for demographic, work condition, and health variables (Table 3). Job satisfaction poorly performed as a predictor of both sickness absence (Nagelkerke's  $R^2 = 0.7\%$ ) and high sickness absence (Nagelkerke's  $R^2 = 3\%$ ).



**Table 1**

Baseline characteristics of the study population.

	Responders (N = 1582)	Lost to follow-up (N = 477)	Analysis
Mean (SD) age	33.2 (8.3)	32.6 (7.9)	$P = 0.26^a$
Gender, N (%)			
Women	1430 (91%)	427 (90%)	$P = 0.53^b$
Men	144 (9%)	48 (10%)	
Setting, N (%)			
Somatic hospital	1191 (76%)	361 (76%)	$P = 0.08^b$
Psychiatric hospital	220 (14%)	61 (13%)	
Nursing home	56 (4%)	17 (4%)	
Home care	61 (4%)	14 (3%)	
Other	40 (3%)	20 (4%)	
Work h/week, N (%)			
<20	45 (3%)	17 (4%)	$P = 0.74^b$
20–29	447 (28%)	130 (27%)	
30–36	202 (13%)	67 (14%)	
>36	882 (56%)	262 (55%)	
Mean (SD) work conditions			
Psychological demands (range 5–20)	14.2 (2.7)	14.6 (2.6)	$P = 0.48^a$
Decision latitude (range 6–24)	17.7 (2.1)	17.6 (2.1)	$P = 0.50^a$
Social support (range 6–24)	17.2 (1.5)	17.3 (1.6)	$P = 0.77^a$
Mean (SD) health score			
Physical summary scale (range 0–100)	50.6 (6.9)	49.8 (6.9)	$P = 0.43^a$
Mental summary scale (range 0–100)	47.8 (9.0)	47.6 (9.2)	$P = 0.76^a$

SD, standard deviation.

<sup>a</sup> *t*-Test for independent samples.<sup>b</sup> Chi-square test.**Table 2**

Job Satisfaction Index (JSI). The table shows the JSI-items and the distribution of JSI-scores at baseline in 1554 nurses with complete data.

	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
I feel fairly satisfied with my present job					
Score	5	4	3	2	1
N (%)	36 (2)	106 (7)	185 (12)	645 (41)	582 (37)
Most days I am enthusiastic about my work					
Score	5	4	3	2	1
N (%)	25 (2)	71 (5)	169 (11)	720 (46)	569 (37)
Each day of work seems like it will never end					
Score	1	2	3	4	5
N (%)	339 (22)	709 (46)	336 (22)	126 (8)	44 (3)
I find real enjoyment in my work					
Score	5	4	3	2	1
N (%)	22 (1)	89 (6)	350 (22)	738 (48)	355 (23)
I consider my job rather unpleasant					
Score	1	2	3	4	5
N (%)	746 (48)	575 (37)	182 (12)	39 (3)	12 (1)

**Table 3**Associations between job satisfaction and sickness absence. The table shows the bivariate (i.e. crude) associations of job satisfaction at baseline with self-reported sickness absence and self-reported high (i.e.  $\geq 31$  days) sickness absence at follow-up of 1554 nurses, as well as multivariate associations after stepwise adjustment for background data.

	Sickness absence		High sickness absence	
	$R^{2a}$	OR (95% CI) <sup>b</sup>	$R^{2a}$	OR (95% CI) <sup>b</sup>
Crude	0.7%	1.05 (1.01–1.09)	3.0%	1.10 (1.06–1.14)
Model 1 (age and gender adjusted)	0.9%	1.05 (1.01–1.09)	3.9%	1.11 (1.07–1.15)
Model 2 (model 1 + setting)	1.9%	1.06 (1.02–1.10)	5.2%	1.11 (1.07–1.15)
Model 3 (model 2 + work h/week)	4.4%	1.06 (1.02–1.10)	6.5%	1.11 (1.07–1.16)
Model 4 (model 3 + work conditions)	5.1%	1.04 (1.00–1.09)	9.0%	1.08 (1.04–1.13)
Model 5 (model 4 + physical health)	6.2%	1.04 (0.99–1.09)	14.8%	1.08 (1.04–1.13)
Model 6 (model 5 + mental health)	6.9%	1.03 (0.98–1.08)	15.8%	1.05 (1.01–1.11)

<sup>a</sup> Nagelkerke's  $R^2$ .<sup>b</sup> Odds ratio (95% confidence interval).

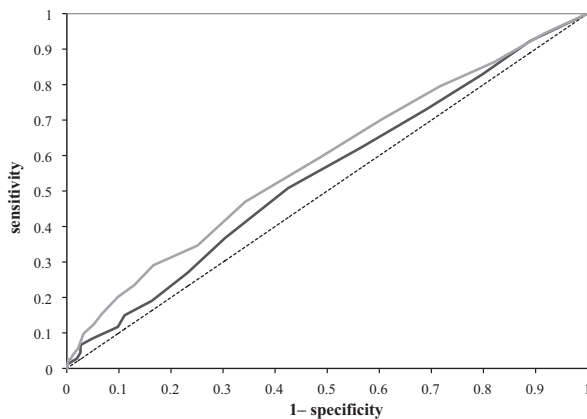


Fig. 1. Receiver operating characteristic (ROC) analysis. The figure shows the ROC curves of job dissatisfaction as risk marker for sickness absence (black line) with an area under the curve (AUC) of 0.54 (95% confidence interval 0.51–0.58) and high ( $\geq 31$  days) sickness absence (gray line) with an AUC of 0.58 (95% confidence interval 0.54–0.63) among 1554 nurses; the dotted line indicates no discrimination above chance.

The Hosmer–Lemeshow goodness-of-fit test showed non-significant  $P$ -values for sickness absence ( $\chi^2$  4.71;  $df = 7$ ;  $P = 0.70$ ) and for high sickness absence ( $\chi^2$  4.19;  $df = 7$ ;  $P = 0.76$ ). The non-significant  $P$ -values indicated that the probabilities of (high) sickness absence as predicted by job satisfaction did not differ significantly from the observed probabilities. Hence, it could be concluded that calibration was acceptable, i.e. job satisfaction accurately predicted future (high) sickness absence.

Discrimination assessed by ROC-analysis (Fig. 1) showed that job satisfaction did not adequately distinguish between nurses with and without sickness absence (AUC = 0.54; 95% CI 0.51–0.58) or between nurses with and without high sickness absence (AUC = 0.58; 95% CI 0.54–0.63).

#### 4. Discussion

The prospective association between job satisfaction and sickness absence was weak, but adjustment for potential confounders did not increase the strength of this association. Further findings indicated that job satisfaction poorly predicted future self-reported sickness absence. Although calibration was acceptable, job satisfaction scores failed to discriminate nurses with sickness absence from those without sickness absence.

##### 4.1. Why job satisfaction failed to identify nurses at risk of sickness absence?

Previously, weak correlations ( $r$ ) between job satisfaction and sickness absence were reported for Maltese ( $r = -0.14$ ) and Hong Kong ( $r = -0.23$ ) nurses (Gauci Borda and Norman, 1997; Siu, 2002). In contrast, Matrunola (1996) did not find a significant association between job satisfaction and sickness absence among English nurses. Thus, these studies indicated no more than a weak relationship between job satisfaction and sickness

absence. We found that baseline job satisfaction was prospectively associated with sickness absence during 1-year follow-up, though associations were weak confirming some of the aforementioned cross-sectional findings. Strong associations between predictor and outcome are a prerequisite in prediction research (Steyerberg, 2009). This was obviously not the case for job satisfaction in our study. The association between job satisfaction and sickness absence could have been underestimated if dissatisfied nurses would be less inclined to participate in the study. Healthy and satisfied employees are more likely to participate in surveys, a phenomenon called the ‘healthy volunteer effect’ (Froom et al., 1999). We found lower job satisfaction scores than those previously reported for the JSI (Brayfield et al., 2001). Furthermore, 82% of participating nurses reported sickness absence. Thus, it is not likely that the results were biased by a ‘healthy volunteer effect’.

Another reason why job satisfaction failed to identify nurses at risk of sickness absence may be that job satisfaction is dynamic and varies according to individual characteristics, choices, perceptions, and expectations as well as organizational policies and management (Murrels et al., 2008). Such variability would cause a dilution of associations between job satisfaction and sickness absence, a phenomenon known as ‘regression dilution bias’ (Steyerberg, 2009). The JSI-scores at follow-up did not differ significantly from the JSI-scores at baseline, but we could not rule out if job satisfaction varied on a day-to-day basis.

Finally, the ROC-curve showed that sensitivities and specificities of JSI-scores were low. Sensitivities are low when there are many false-negatives, i.e. satisfied nurses who had (high) sickness absence during follow-up. Specificities are low when there are many false-positives, i.e. nurses with low job satisfaction who did not have (high) sickness absence. Thus, there are two problems that restrict the use of overall job satisfaction to identify working nurses at risk of sickness absence: (1) low job satisfaction is a weak and probably variable predictor of sickness absence, and (2) high job satisfaction does not sufficiently rule out future sickness absence. In other words, overall job satisfaction is neither a strong nor a specific predictor of sickness absence. Multidimensional job satisfaction instruments, which measure attitudes toward various aspects of nursing (Mueller and McCloskey, 1990; Ng, 1993), may better (i.e. stronger and more specifically) predict sickness absence in working nurses.

##### 4.2. Strengths and limitations

The prospective design of the Survey of Shift work, Sleep and Health was an asset as compared to earlier cross-sectional studies of job satisfaction and sickness absence among nurses, though the current study presents secondary analyses of data from an observation period of one year only. Both job satisfaction and sickness absence were measured by questionnaires, but common method bias (Podsakoff et al., 2003) was unlikely as job satisfaction was measured at baseline and sickness absence at follow-up. Although there was a 23% loss to follow-up after one year,

the baseline characteristics of nurses who responded at follow-up did not differ from those who were lost to follow-up.

The study used self-reported sickness absence data and the validity of such data is subject to debate. Of individuals with recorded sickness absence, 55% (Van Poppel et al., 2002) to 93% (Grøvre et al., 2011) also reported sickness absence. Gaudine and Gregory (2010) found a strong correlation between self-reported sickness absence and absence as recorded in organizational registries in 215 Canadian nurses. However, 51% of nurses underestimated the number of sickness absence days. The agreement between self-reported and recorded sickness absence days decreases with increasing sickness absence durations (Ferrie et al., 2005; Voss et al., 2008). Probably, it is more difficult to recall the exact number of many sickness absence days, especially over longer recall periods (Grøvre et al., 2011). We dealt with the problem of recalling the exact number of sickness absence days by categorizing sickness absence in the past 12 months. Furthermore, we used the occurrence of sickness absence and high ( $\geq 31$  days) sickness absence as dichotomous outcome measures. In a female-dominated population of Swedish public service employees working in human service occupations, Voss et al. (2008) found that 91% of all employees, who had any sickness absence according to register data, reported to have had sickness absence in a recall period of 12 months. For women and men with  $\geq 28$  sickness absence days according to register data, 67% and 73%, respectively, reported  $\geq 28$  sickness absence days over a 12 months recall period.

Another limitation was that we could not differentiate between types (i.e. short-term or long-term) of sickness absence. Traditionally, frequent short-term sickness absence is regarded as a type of withdrawal behavior (Hackett and Bycio, 1996; Kohler and Matthieu, 1993), while long-term sickness absence is associated with severe disorders or conditions that fail to improve sufficiently (Henderson et al., 2005). Possibly, job satisfaction is stronger related to short-term sickness absence (Gauci Borda and Norman, 1997; Marmot et al., 2005; Roelen et al., 2011) and, thus, may better forecast short-term sickness absence. Finally, we did not have the causes of sickness absence at our disposal, while it is conceivable that associations between job satisfaction and sickness absence attenuate when there are more illnesses, such as the flu and other febrile disorders that result in sickness absence regardless of job satisfaction.

## 5. Practical implications

Sickness absence among nurses is an important problem that contributes to nursing staff shortages and consequently reduces the efficiency and the quality of care. The current study showed that job satisfaction is one of the factors affecting sickness absence in nurses (Davey et al., 2009). We found that low job satisfaction was associated with a higher risk of sickness absence. Improving nurses' job satisfaction might help to prevent sickness absence. Organizational commitment, occupational stress, and autonomy are consistently related to nurses' job satisfac-

tion. Together with professional commitment, role ambiguity, educational level, age and number of working years, these factors were found to explain about 40% of the variance in job satisfaction among nurses in Mainland China (Lu et al., 2007). For the purpose of improving nurses' job satisfaction, we still need a robust causal model showing interactions between moderators of job satisfaction (Lu et al., 2012).

To prevent sickness absence, it may be useful to assess risk factors of sickness absence among nurses who are still at work, with the purpose to invite high-risk individuals for preventive counseling. Preventive occupational health consultations were reported to reduce long-term sickness absence among high-risk employees (Taimela et al., 2008a,b; Kant et al., 2008). Such preventive consultations aim at recognizing work-related and non work-related health problems and may reveal the need for targeted interventions or specialist diagnosis and treatment. To forecast the risk of sickness absence, we need strong predictors of sickness absence. Job satisfaction predicts sickness absence among nurses (Davey et al., 2009) and, therefore, one might think of measuring job satisfaction in nursing populations. However, we found that overall job satisfaction measured with the JSI was not a strong predictor of future sickness absence and did not adequately discriminate nurses with sickness absence from nurses without sickness absence in the coming year. We need further research to investigate whether other (multidimensional) job satisfaction instruments identify nurses at work, but at risk of future sickness absence.

## Conflict of interest

None declared.

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## Ethical approval

The Regional Committee for Medical and Health Research Ethics, West Norway approved of the study (reference 088.C8).

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